GET OUT YOUR F=MA ACTIVITY AND A PENCIL OR PEN

If you had EQ corrections please turn them in NOW!

F=MA

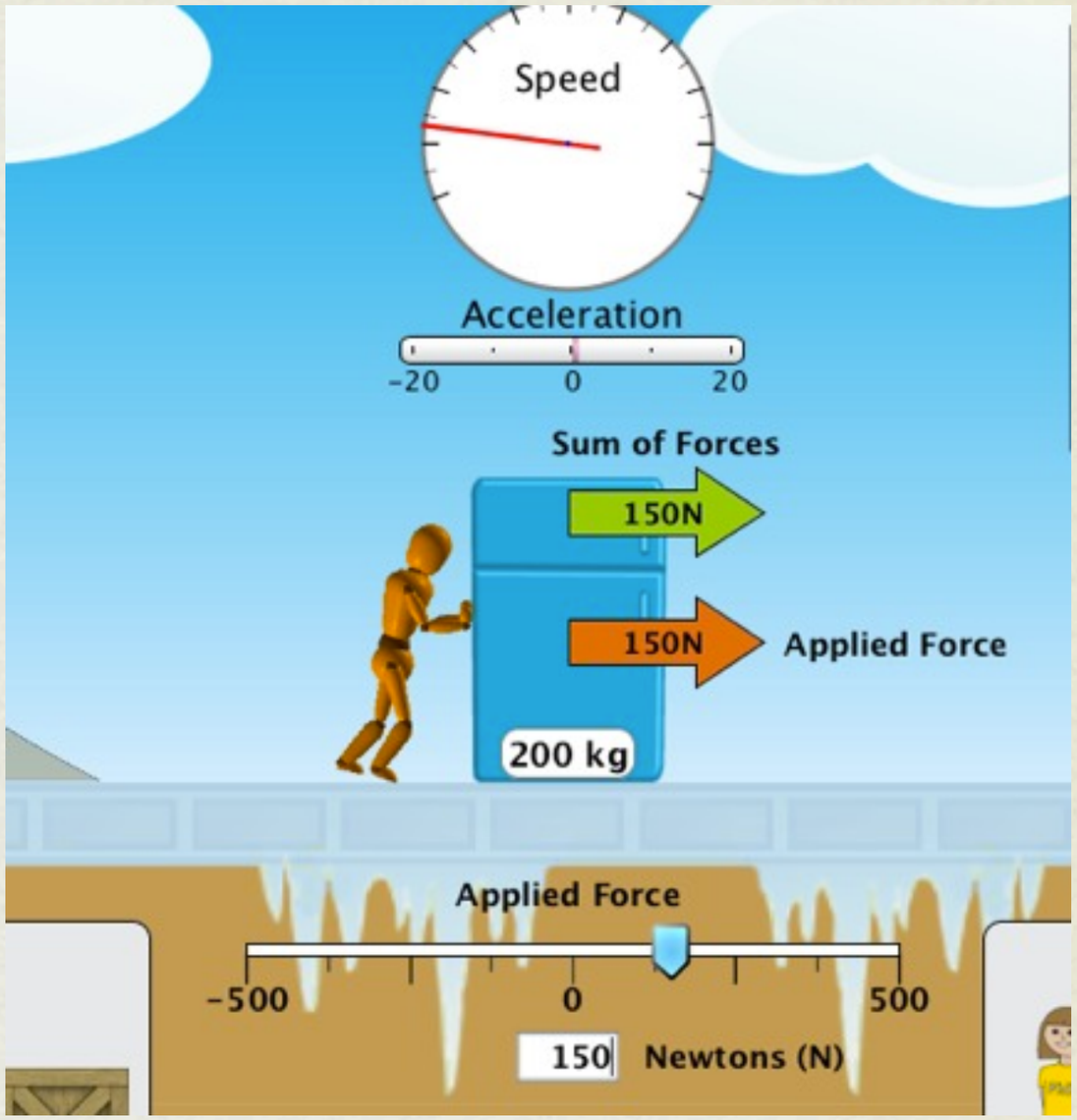
Look at your activity.....

What do you notice about the acceleration of the objects if the force applied remains the same and the mass of the object being pushed increases?

If the force applied remains the same - the acceleration of the object decreases as the mass of the object being pushed increases

What do you notice about the acceleration when the mass of the object remains the same but the force applied on the object increases?

If the mass of the object remains the same - the acceleration of the object being pushed increases as the force applied on the object increases



Variables:
Constant force
IV- Mass DV- Acceleration
Constant Mass:
IV- Force DV- Acceleration

TERMS:

Force: A push or pull on an object

UNIT: Newton

Mass: The amount of matter an object is made up of

UNIT: kg

Acceleration: Change in velocity over a period of time (slowing down, speeding up, changing direction)

UNIT: m/s^2

NEWTON'S 2ND LAW OF MOTION

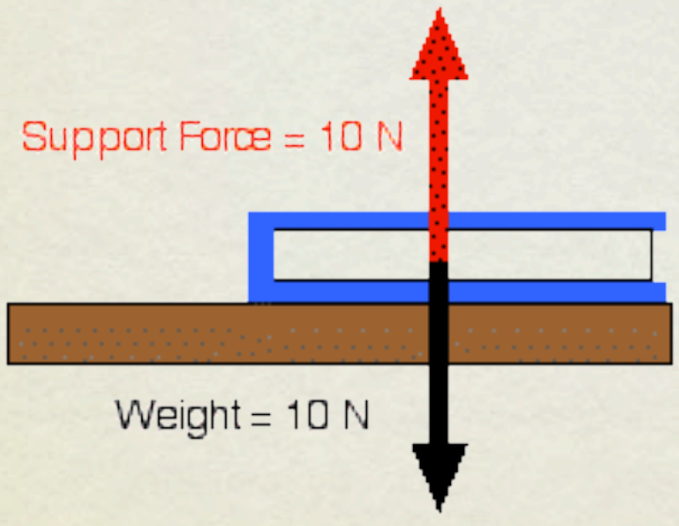
The second law states that the acceleration of an object is dependent upon two variables - the net force acting upon the object and the mass of the object.

The acceleration of an object depends directly upon the *net force* acting upon the object, and inversely upon the mass of the object.

As the force acting upon an object is increased, the acceleration of the object is increased. As the mass of an object is increased, the acceleration of the object is decreased.

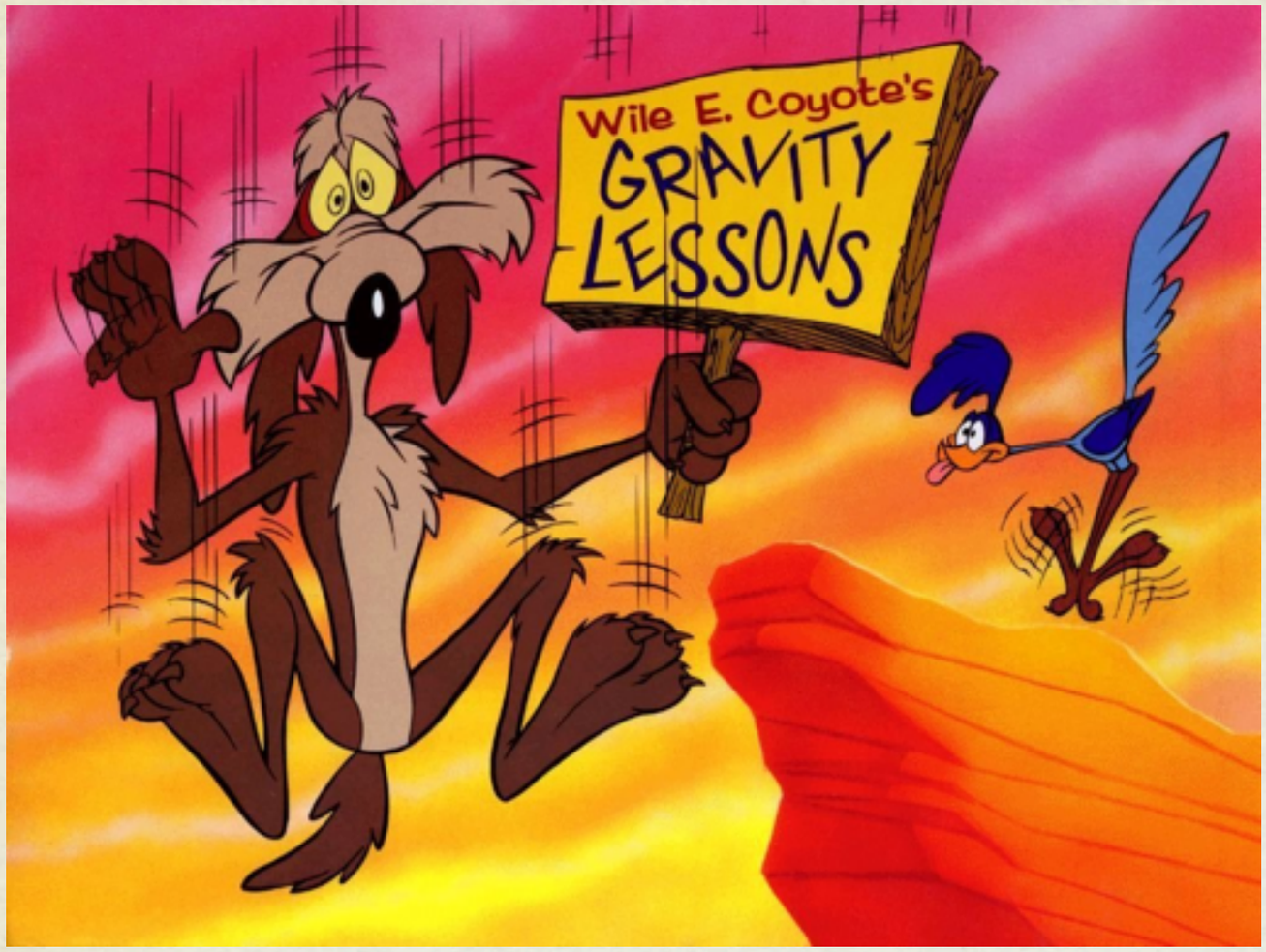
FORCES TO CONSIDER:

- Applied force: a force that is applied to an object by a person or another object. If a person is pushing a desk across the room, then there is an applied force acting upon the object. The applied force is the force exerted on the desk by the person.



- Normal force: the support force exerted upon an object that is in contact with another stable object. For example, if a book is resting upon a surface, then the surface is exerting an upward force upon the book in order to support the weight of the book.

MORE FORCES TO CONSIDER...



- Gravitational force: more than the force with which the earth, moon, or other massively large object attracts another object towards itself. By definition, this is the weight of the object. All objects upon earth experience a force of gravity that is directed "downward" towards the center of the earth.

- Fgrav = m * g

- where g = 9.8 N/kg (on Earth)

- and m = mass (in kg)

MORE FORCES TO CONSIDER...

- Air resistance: a special type of frictional force that acts upon objects as they travel through the air.

- The force of air resistance is often observed to oppose the motion of an object. It is most noticeable when objects are moving at high speeds or have a lot of surface area!

F=MA PRACTICE

- Sally has a car that accelerates at 5 m/s^2. If the car has a mass of 1000 kg, how much force does the car produce?

- F=_____
- m=_____
- a=_____

F=MA PRACTICE

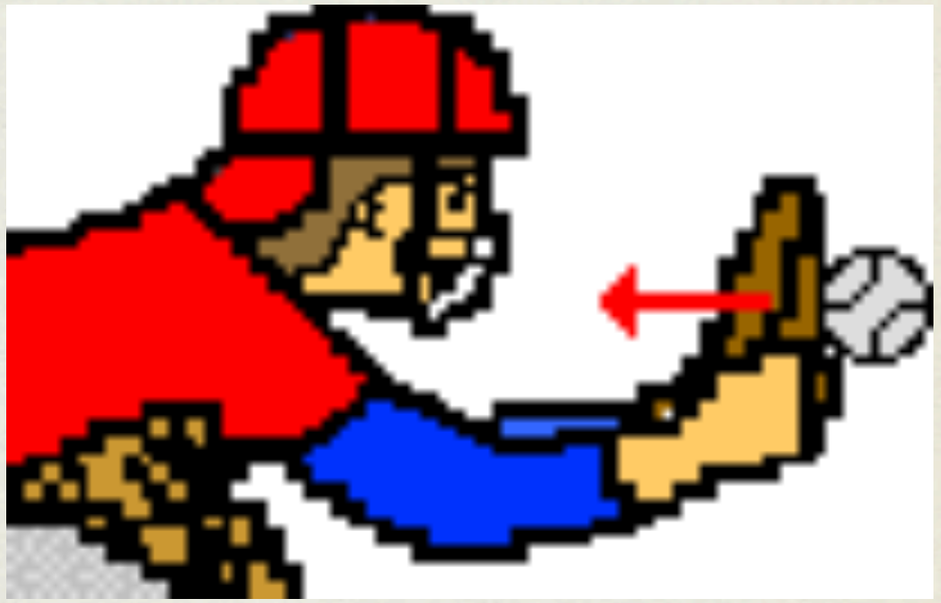
- Your car has a mass of 2000 kg. If your car produces a force of 5000 N, how fast will it accelerate?
- F=_____
- m=_____
- a=_____
- HINT - you have to manipulate the equation!

NEWTON'S 3RD LAW OF MOTION

According to Newton's third law, for every action force there is an equal (in size) and opposite (in direction) reaction force. Forces always come in pairs - known as "action-reaction force pairs."

FORCE PAIRS...

- Identifying and describing action-reaction force pairs is a simple matter of identifying the two interacting objects and making two statements describing *who is pushing on whom* and in what direction.



IDENTIFY AT LEAST 4 FORCE PAIRS

If you can identify more than 4, do it!

- The elephant's feet push backward on the ground; the ground pushes forward on its feet.

- The right end of the right rope pulls leftward on the elephant's body; its body pulls rightward on the right end of the right rope.

- The left end of the right rope pulls rightward on the man; the man pulls leftward on the left end of the right rope.

- The right end of the left rope pulls leftward on the man; the man pulls rightward on the right end of the left rope.

- The tractor pulls leftward on the right end of the left rope; the left end of the left rope pulls rightward on the tractor

DON'T FORCE PAIRS CANCEL OUT?!

No…. Think about our sudden stops lab earlier this year….

We let the cart go down the ramp with a mass on top of it…

The cart hit the textbook and it stopped while the mass kept going because….

The cart stopped because a NET FORCE was acting on it!

What would have happened if you did not hold the textbook ?
It would have moved, because the CART exerted a FORCE on the book!

HTTP://WWW.YOUTUBE.COM/WATCH?V=MNM5THOU4IQ

- What was Dr. Carlson “throwing” in the opposite direction of his motion??

- This is how a jet engine works - the engine “throws” air in the opposite direction that it moves. If it throws air one way it moves the opposite way!